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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/680,777	10/06/2003	Clinton W. Schneider	VT0303-US1	5855

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EXAMINER

ARANCIBIA, MAUREEN GRAMAGLIA

ART UNIT PAPER NUMBER

1763

DATE MAILED: 11/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/680,777

**Applicant(s)**

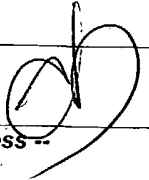
SCHNEIDER ET AL.

**Examiner**

Maureen G. Arancibia

**Art Unit**

1763



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 October 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-21 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                                    |                                                                             |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____                                                |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____                                                                        | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

***Election/Restrictions***

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-20, drawn to a method of producing a capacitor electrode, classified in class 216, subclass 55.
  - II. Claim 21, drawn to an anode foil, classified in class 361, subclass 303.
2. The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product claimed in Invention II could be made by another, materially different process; for example, by forming a pattern on the foil with a heat gun.
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.
4. During a telephone conversation with Steven Mitchell on 10/15/2004 a provisional election was made without traverse to prosecute the invention of Group 1, Claims 1-20. Affirmation of this election must be made by applicant in replying to this Office action. Claim 21 is withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

***Information Disclosure Statement***

6. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

***Specification***

7. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: The first paragraph on Page 11 of the Specification discloses that the electrochemical etching should be carried out with a particular range in current density, or with a corresponding range in etch charge (Coulombs/cm<sup>2</sup>) for a specific amount of time. The Specification does not disclose that the charge on the foil should be monitored or that etching should be stopped when the charge reaches a predetermined level, as recited in Claim 7 and its dependent Claims 8-11, or that the charge on the foil should be between about 15 to 50 Coulombs, as recited in Claim 9.

***Claim Rejections - 35 USC § 112***

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 7-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Specifically, Claim 7 recites an electrochemical etching process comprising steps of applying a charge to the foil to be etched, monitoring said charge, and stopping the etching process when the charge reaches a predetermined level. However, in the Specification (Page 11, first paragraph), Applicant discloses that the etching process should be carried out with a particular etch charge for a specified length of time. It is therefore unclear what process Applicant intends to claim. For the purposes of the following evaluation on the merits, Claim 7 and its dependents, Claims 8-11, have been interpreted to claim an etching process carried out with a particular etch charge for a specified length of time. Appropriate correction is required.

Additionally, Claim 9 recites the limitation that the electrochemical etching should be stopped when the charge reaches about 15 to 50 Coulombs. It appears that the only basis in the specification for this claim is found in the first paragraph of Page 11, which discloses that the range in current density, 0.1 to 0.3 Amp/cm<sup>2</sup>, corresponds to an etch charge of 5 to 50 Coulombs/cm<sup>2</sup> for a particular period of time. In order to obtain the range in charge recited in Claim 9 from this information, Applicant must also have assumed a particular size for the foil to be etched. Appropriate correction is required to

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make clear the scope of the recited limitation. For the purposes of the following evaluation on the merits, the Examiner has interpreted Claim 9 as claiming the disclosed range in etch charge, 5 to 50 Coulombs/cm<sup>2</sup>.

***Claim Rejections - 35 USC § 102***

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1, 3, 4, 6, 16, 17, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Japanese Unexamined Patent Application Publication 59-083772-A (the '772 Publication).

The '772 Publication discloses a method of manufacturing an electrode foil for a capacitor, comprising forming a pattern of fine lines (1) on the foil surface (2) with a laser beam, and then etching the foil. (English abstract)

In regards to Claim 3, the application of the laser beam causes oxidation of the surface. (English abstract)

In regards to Claim 4, the laser beam is applied before the etching step. (English abstract)

In regards to Claim 6, according to an oral translation, the first embodiment of the '772 Publication discloses that the etching step should be a conventional electrochemical process. (Page 2, Column 2, last paragraph)

In regards to Claim 16, the '772 Publication teaches a ripstop pattern (Figure 1) and a grid pattern (Figure 3).

In regards to Claim 17, the '772 Publication teaches that laser beam can be applied to both sides of the foil. (English abstract)

In regards to Claim 19, according to an oral translation, the first embodiment of the '772 Publication includes a step of forming the foil in a boric solution at a voltage of 375 V. (Page 2, Column 2, last paragraph)

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 1, 2, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over the English Abstract of Japanese Unexamined Patent Application Publication 02-075155-A (the '155 Abstract) in view of U.S. Patent 6,426,864 to O'Phelan et al.

The '155 Abstract teaches that a laser can be applied to a porous electrode foil to heat the foil and thereby form a pattern (i.e. specified shapes). (Constitution)

The '155 Abstract does not teach that the electrode foil can also be etched.

O'Phelan et al. teaches a method of etching an electrode foil to form a porous structure (8). (Column 4, Lines 14-29)

It would have been obvious to one of ordinary skill in the art to obtain the porous structure of the electrode foil taught by the '155 Abstract by etching the foil with the

method taught by O'Phelan et al. The motivation for doing so, as taught by O'Phelan et al. (Column 2, Lines 13-15), would be to obtain an electrode foil with both durability and good electrolyte-flow characteristics.

In regards to Claim 2, the '155 Abstract teaches that the application of the laser causes local melting of the foil. (Constitution)

The combination of O'Phelan et al., which teaches a method of making the foil porous by etching, and the '155 Abstract, which teaches that the laser beam should be applied to an electrode foil that is already porous (Constitution), meets the limitations of Claim 5.

14. Claims 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over the '772 Publication in view of U.S. Patent 5,715,133 to Harrington et al.

The '772 Publication teaches the limitations of Claim 6, on which Claim 7 depends, including that the etching step can be an electrochemical process. (First embodiment)

The '772 Publication does not expressly disclose that the electrochemical etching process should comprise: placing the foil in an electrochemical bath comprising an anode portion with an anode electrolyte and a cathode portion; connecting the foil to a charge source in the anode portion of said bath; and applying an etch charge to the foil for a specified amount of time. The '772 Publication also does not expressly teach claimed parameters of the etching process recited in Claims 8-11: a current density of about 0.10-0.25 Amp/cm<sup>2</sup>; a corresponding etch charge of 5-50 Coulombs/cm<sup>2</sup>; an



anode electrolyte comprising about 1-3% sodium chloride and about 2-5% sodium perchlorate or sodium persulfate; and an electrolyte temperature of about 80-90°C.

Harrington et al. teaches an electrochemical etching process that includes placing the foil (1) in an electrochemical bath comprising cathode portions (5) and an anode portion (4) filled with an anode electrolyte comprising 1.3% by weight sodium chloride and 3.5% by weight sodium perchlorate (Column 3, Lines 42-50), and applying a current. (Column 3, Line 63) The current density can range from 0.08-0.35 Amp/cm<sup>2</sup>. (Column 3, Lines 14-15) Harrington et al. actually performs the electrochemical etching with a current density of 0.15 Amp/cm<sup>2</sup> for a specified time, 250-267 sec. (Column 4, Table, Step 3) These conditions correspond to an etch charge of 37.5-40.1 Coulombs/cm<sup>2</sup>. (Etch charge [Coulombs/cm<sup>2</sup>] = Current density [Amps/cm<sup>2</sup>] x Time [sec]) Harrington et al. also teaches that the anode electrolyte should be at 75-90 °C during the etching process. (Column 4, Table, Step 3)

It would have been obvious to one of ordinary skill in the art to perform the method of the '772 Publication using the electrochemical etching process and parameters taught by Harrington et al. The motivation for doing so, as taught by Harrington et al. (Column 2, Lines 35-42), would have been to use an electrochemical process that maintains electrolyte efficacy during the etching.

15. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over the '772 Publication in view of U.S. Patent 3,779,877 to Alwitt.

The '772 Publication teaches all of the limitations recited in Claim 1, on which Claim 18 depends.

The '772 Publication does not expressly disclose that the method of Claim 1 should further comprise, after the steps of applying the laser to the foil and etching the foil, a step of widening the foil.

Alwitt teaches that a process of electrochemically etching a capacitor foil should be followed by a step of widening the foil; i.e. further etching the previously etched areas without initiating new etch sites. (Column 1, Lines 60-67; Column 2, Lines 1-2)

It would have been obvious to modify the method taught by the '772 Publication to include a step of widening the etched foil, as taught by Alwitt. The motivation for doing so, as taught by Alwitt (Column 1, Lines 55-57), would have been to produce a capacitor foil with reproducibly uniform etched features.

16. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over the '772 Publication in view of U.S. Patent 4,481,084 to Chen et al. and "A New Coating Process for Aluminum" by Patel et al. (Posted on 10/25/2000 on <http://www.ceramicindustry.com>)

The '772 Publication teaches all of the limitations of Claim 19, on which Claim 20 depends, including a step of forming the foil at 375 V. (First embodiment)

The '772 Publication does not teach the process of forming the foil recited in Claim 20, comprising forming the foil in a solution comprising citric acid, with a temperature of 80-100 °C and a current density of 10-20 mA/cm<sup>2</sup>.

Chen et al. teaches a process of forming a capacitor foil in a solution comprising citric acid at a temperature of 70-90 °C. (Column 1, Line 44-50)

Patel et al. teaches that aluminum is traditionally formed (anodized) at current densities of 10-100 mA/cm<sup>2</sup> (1-10 A/dm<sup>2</sup>). (Page 1, second paragraph)

It would have been obvious to one of ordinary skill in the art to modify the process of forming the foil taught by the '772 Publication to use a solution of citric acid at 70-90 °C, as taught by Chen et al., and to have a current density between 10-100 mA/cm<sup>2</sup>, as taught by Patel et al.

The motivation for using a forming solution comprising citric acid, as taught by Chen et al. (Column 2, Lines 25-27), would have been that its presence helps to promote crystalline oxide formation. The amount of crystalline oxide is associated with higher capacitance. (Chen et al., Column 1, Lines 30-31) The motivation for having the forming solution at 70-90 °C, as taught by Chen et al. (Column 2, Lines 54-55), would have been that a high forming solution temperature results in a more crystalline oxide layer. The motivation for having a current density between 10-100 mA/cm<sup>2</sup>, as taught by Patel et al. (Page 1, second paragraph), would have been to use a conventional current density for the forming process.

17. Claims 7-11, 18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the '772 Publication in view of U.S. Patent 6,802,954 to Hemphill et al.

In regards to Claims 7-11, the '772 Publication teaches the limitations of Claim 6, on which Claim 7 depends, including that the etching step can be an electrochemical process. (First embodiment)

As discussed above in Paragraph 14, the '772 Publication does not expressly disclose the steps for the electrochemical etching process recited in Claim 7, nor the claimed parameters of the etching process recited in Claims 8-11.

Hemphill et al. discloses an electrochemical etching process for a capacitor foil that meets the limitations of Claim 7, namely etching the foil according to a conventional process by placing it in an anode electrolyte and applying a current with a particular density for a specified period of time. (Column 4, Lines 17-18 and 33-51) Hemphill et al. also teaches the claimed parameters of the etching process recited in Claims 8-11: a current density of 0.1 to 0.3 Amp/cm<sup>2</sup>; a etch charge of 5-50 Coulombs/cm<sup>2</sup> for a particular period of time; an anode electrolyte comprising 1.3% sodium chloride and 3.5% sodium perchlorate; and an electrolyte temperature of 80-100 °C.

It would have been obvious to one of ordinary skill in the art to use the electrochemical etching steps and parameters taught by Hemphill et al. in the method of the '772 Publication. The motivation for doing so, as taught by Hemphill et al. (Column 2, Lines 47-49; Column 4, Lines 23-27), would have been to produce an enlargement in surface area of the foil of at least 20 times, thereby increasing the capacitance of the capacitor made from the etched foil.

In regards to Claim 18, the '772 Publication does not teach a step of widening the foil after the steps of applying the laser and etching the foil.

Hemphill et al. teaches that the etched foil should be widened. (Column 5, Lines 61-62)

It would have been obvious to one of ordinary skill in the art to modify the method taught by the '772 Publication to include a step of widening the foil, as taught by Hemphill et al. The motivation for doing so would have been to further increase the surface area of the etched foil.

In regards to Claim 20, the '772 Publication teaches all of the limitations of Claim 19, on which Claim 20 depends, including a step of forming the foil at 375 V. (First embodiment)

The '772 Publication does not teach the process of forming the foil recited in Claim 20, comprising forming the foil in a solution comprising citric acid, with a temperature of 80-100 °C and a current density of 10-20 mA/cm<sup>2</sup>.

Hemphill et al. teaches that the process of forming the foil can comprise placing the foil in a forming solution of citric acid at 80-100 °C, and applying a current at a density of 1-40 mA/cm<sup>2</sup>. (Column 6, Lines 8-14)

It would have been obvious to one of ordinary skill in the art to modify the forming process taught by the '772 Publication to use a forming solution comprising citric acid at 80-100 °C, and to apply a forming current at a density of 1-40 mA/cm<sup>2</sup>, as taught by Hemphill et al. The motivation for making these modifications, as taught by Hemphill et al. (Column 6, Lines 14-20), would have been to have a forming process that produces a barrier oxide layer with a high resistance to leakage current.

18. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over the '772 Publication in view of the English abstract of Japanese Unexamined Patent Application Publication 07-049428-A (the '428 Abstract).

The '772 Publication teaches the limitations recited in Claim 1, on which Claim 12 depends, including a step of applying a laser to a foil. (English abstract)

The '772 Publication does not expressly disclose that the laser can be an Nd:VO<sub>4</sub>, Nd:YAG, or CO<sub>2</sub> laser.

The '428 Abstract discloses that an Nd:YAG (i.e. YAG) laser can be used to heat a metal layer (14). (Constitution)

It would have been obvious to one of ordinary skill in the art to use an Nd:YAG laser, as taught by the '428 Abstract, in the method taught by the '772 Publication. The motivation for doing so, as taught by the '428 Abstract (Constitution), would have been to use a laser that was capable of heating metal sufficiently to oxidize it.

19. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over the '772 Publication in view of the '428 Abstract as applied to Claim 12, and further in view of U.S. Patent Application Publication 2002/0111029 to Johnson.

The combination of the '772 Publication and the '428 Abstract meets the limitations of Claim 12.

The combination of the '772 Publication and the '428 Abstract does not teach that the laser scan rate can be in the range of about 20-500 mm/sec, or that the laser beam spot size can be in the range of about 20-100 microns.

Johnson teaches a method of laser etching with a laser scan rate of 20-40 mm/sec and a laser beam spot size of 18-25 microns. (Paragraph 38)

It would have been obvious to one of ordinary skill in the art to modify the method taught by the combination of the '772 Publication and the '428 Abstract to have a laser

scan rate of 20-40 mm/sec and a laser beam spot size of 18-25 microns, as taught by Johnson. The motivation for using the parameters in scan rate and spot size taught by Johnson would have been to finely control the application of the laser. (Johnson, Paragraph 34)

20. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over the '772 Publication.

The '772 Publication teaches all of the limitations of Claim 1, on which Claim 15 depends. According to an oral translation, the '772 Publication concludes (Page 2, Column 2, third paragraph) that the foil etches more deeply where the lines are not formed.

The '772 Publication does not expressly disclose that the laser beam can be used to create an irregular pattern of fine lines (1).

Nevertheless, it would have been obvious to one of ordinary skill in the art to use the laser beam to create an irregular pattern on the surface of the foil. The motivation for doing so would have to preferentially protect some areas of the foil (i.e. where the foil is to be folded or welded) from deeper etching, thereby giving those areas greater strength.

### ***Conclusion***

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571) 272-1219. The examiner can normally be reached on 10:30-7:00, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (571) 272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Maureen G. Arancibia

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